

REMARKS

Favorable reconsideration of this application, in light of the following discussion and in view of the present amendment, is respectfully requested.

Claims 1-12 and 14-29 are pending in the present application. Claim 13 is canceled without prejudice, claims 10-12, 19-22, 24 and 25 are withdrawn and claims 1-9, 13-18, 23 and 26-29 are amended by the present amendment.

Claims 1-4, 6, 9, 13, 14, 23, 26 and 27 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,859,921 to SUZUKI. This rejection is respectfully traversed.

Amended independent claim 1 recites, *inter alia*, “determining whether a candidate interval area among the plurality of candidate interval areas is between the first and second candidate eye areas,” and “designating the candidate eye area as the interval between the first and second eyes when the candidate interval area is determined to be between the first and second candidate eye areas.” Independent claims 14, 17, 18, 23 and 26-29 are amended to recite similar features, support for which is found in the specification at least at page 12, lines 6-18 (claims 17, 18, 28 and 29 are also rewritten in independent form, and recite features similar to amended independent claim 1).

In a non-limiting example, FIG. 1 shows an eye-interval determining section 118 that examines whether an eye-interval candidate area exists between two eye candidate areas to determine an eye-interval area, and outputs coordinates of the eye-interval area as an eye-interval area signal 119. The face determining section 120 reads the eye-

interval area signal 119, and outputs a face area signal 121 indicative of coordinates of a face area (see the specification at page 12, lines 6-18).

As an advantage of the present invention, it is possible to correctly detect candidate areas for an interval between the eyes even in a broadcast image or an image taken by a digital video camera, by determining whether the candidate interval is present between two candidate areas for the eyes. Because it is unlikely that more than one set of two eye-like patterns will appear in even a very complex background along with an additional background pattern resembling an interval between the eyes, incorrect detection is avoided.

By contrast, SUZUKI (which is directed to obtaining an image of a face of an automobile driver) only discloses extracting “a black-level area smaller at least in the dimension along one image axis (X-axis) parallel or nearly parallel to a vertical direction of a face than a predefined length corresponding to an up-to-down width of an eye.” As acknowledged in the outstanding Office Action, SUZUKI “fails to explicitly disclose the candidate area for an interval between eyes from a positional relationship.”

In SUZUKI, when the background contains many black level areas, the patterns of the eyebrows, etc. are extracted by filtering. Thus, accurate images are difficult to obtain since the centroid position of the face cannot be correctly detected.

In SUZUKI, it is possible that the influence of extraneous patterns in the background of an image, but which are not part of a face, may prevent correct detection of a centroid position of the face or the positions of the nostrils. Such a possibility is

avoided by “designating the candidate eye area as the interval between the first and second eyes when the candidate interval area is determined to be between the first and second candidate eye areas” and “determining a face area from the designated interval between the first and second eyes,” as recited in independent claim 1, for example.

The present invention detects candidate eye areas and candidate interval areas. When a candidate interval is between candidate eye areas, the present invention determines the interval and determines a face based upon the determined interval. In contrast, SUZUKI merely detects eye areas.

Accordingly, it is respectfully submitted amended independent claims 1, 14, 17, 18, 23 and 26-29 and each of the claims depending therefrom patentably distinguish over SUZUKI.

Moreover, it is respectfully submitted the pending dependent claims further patentably distinguish over SUZUKI. Amended claim 2 (which depends on amended independent claim 1) recites, *inter alia*, “the first and second candidate eye areas are detected from the luminance characteristics corresponding to a first plurality of portions of the input image having a substantially horizontal alignment and a second plurality of portions of the input image having a substantially vertical alignment,” in which “there are fewer of the second plurality of portions than a threshold amount,” support for which is found in the specification at least at page 14, line 24 to page 15, line 14).

In a non-limiting example, by taking into consideration both the approximately horizontal segments as well as the approximately vertical segments of a candidate area, it

can be determined that the candidate area is an eye candidate when the number of approximately vertical segments are few in number (for example, below a threshold). Therefore, the precision of detection is improved.

By contrast, SUZUKI at col. 3, lines 53-58 only discusses extracting “a black-level area smaller in the dimension along the X-axis than a predetermined length corresponding to an up-to-down width of an eye.” It is respectfully submitted the “length corresponding to an up-to-down width of an eye” is different from detecting a candidate eye area when “there are fewer of the second plurality of portions than if the first plurality of portions” as recited in amended claim 2.

Moreover, amended claim 3 (which depends on amended independent claim 1) recites, *inter alia*, “the candidate interval areas are detected from the luminance characteristics corresponding to a plurality of areas of the input image having fewer substantially horizontal portions and substantially vertical portions than a threshold amount,” support for which is found in the specification at least at page 15, line 15 to page 16, line 2.

In a non-limiting example, it is possible to determine whether an area between two candidate eye areas is an interval candidate by examining whether there are fewer horizontally-aligned segments and vertically-aligned segments than a threshold amount. When there are few of those segments, the area may be determined to be an interval candidate. Further, if the area is between two eye candidates but has relative few vertically-aligned segments while having more horizontally-aligned segments, the area

may be determined to be an interval candidate on a face with glasses, because a face with glasses is likely to have horizontally-aligned segments (corresponding to the bridge of the glasses across the nose) but few vertically-aligned segments.

By contrast, SUZUKI does not disclose or suggest such features.

Further, the other dependent claims also recite distinguishing features. Accordingly, it is respectfully submitted the pending dependent claims even further patentably distinguish over SUZUKI.

Claims 5, 7 and 8 were rejected under 35 U.S.C. § 103(a) as unpatentable over SUZUKI and U.S. Patent No. 6,215,891 to SUZAKI et al (herein "SUZAKI"). This rejection is respectfully traversed.

Claims 5, 7 and 8 depend on amended independent claim 1, which as discussed above is believed to patentably distinguish over SUZUKI. Further, SUZAKI only discusses dividing an input image into blocks and calculating size, circularness, edge intensity and peripheral density analysis, but also does not disclose the above-noted features of the pending claims.

Accordingly, it is respectfully submitted the pending claims also patentably distinguish over SUZUKI and SUZAKI.

Claims 15-18, 28 and 29 were rejected under 35 U.S.C. § 103(a) as unpatentable over SUZUKI in view of U.S. Patent No. 5,781,650 to LOBO et al (herein "LOBO"). This rejection is respectfully traversed.

Claims 15 and 16 depend on amended independent claim 1, and amended independent claims 17, 18, 28 and 29 recite features similar to amended independent claim 1, which as discussed above is believed to patentably distinguish over SUZUKI. Further, LOBO only discloses classifying facial images into age categories, but also does not disclose or suggest the above-noted features of the pending claims.

Accordingly, it is respectfully submitted the pending claims also patentably distinguish over SUZUKI and LOBO.

Further, claims 1-9, 13-18, 23 and 26-29 are amended to correct minor informalities and to better conform to standard claim drafting practice. It is believed no new matter is added.

SUMMARY AND CONCLUSION


Applicants have made a sincere effort to place the present application in condition for allowance and believe that they have now done so.

Consequently, in light of the above discussion and in view of the present amendment, this application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Any amendments to the claims which have been made in this amendment, and which have not been specifically noted to overcome a rejection based upon the prior art, should be considered to have been made for a purpose unrelated to patentability, and no estoppel should be deemed to attach thereto.

Should the Examiner have any questions or comments regarding this Response, or the present application, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,
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